



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

AUG 26 1999

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

SUBJECT: Approval of New Testing Procedures for Measurement of Stack Gas Flow Rate for Optional Application in Place of Method 2 under 40 CFR Parts 60, 61, and 63

FROM: J. David Mobley, Acting Director
Emissions, Monitoring, and Analysis Division (MD-14)

TO: Addressees

A handwritten signature in black ink, appearing to read "J. David Mobley", written over the typed name in the "FROM:" field.

On May 14, 1999, the Acid Rain Division of OAR published in the Federal Register a Direct Final Rule for addition to Appendix A of 40 CFR Part 60 entitled "Test Methods: Three New Methods for Velocity and Volumetric Flow Rate Determination in Stacks or Ducts." As no adverse comments were received, these methods became effective on July 13, 1999, for optional application under the Acid Rain Program's flow rate measurement requirements that are contained in 40 CFR Part 75. This memorandum is to advise you that we have judged these new methods, Methods 2F, 2G, and 2H, to be technically sound for broad application, and that we approve them for optional use in place of Method 2 or as a supplement to Method 2 in any subpart to 40 CFR Part 60, 61, or 63 where Method 2 is now the specified flow rate measurement method. We believe that Methods 2F, 2G, and 2H are also appropriate for optional use in place of Method 2 testing requirements in State Implementation Plans under 40 CFR Part 51; however, we defer to the Regions to issue these approvals under Delegation 7-10. These new test methods will provide ways for testers to improve measurement of volumetric flow rate under atypical flow conditions that may be encountered in some emission stacks and ducts.

BACKGROUND

In 1971, EPA promulgated Method 2 "Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube)" in Appendix A to 40 CFR Part 60. At the time of its development, Method 2 was principally used with EPA Method 5 "Determination of Particulate Emissions from Stationary Sources" to help ensure isokinetic sampling rates throughout a particulate sampling run.

Many EPA air quality regulations use Method 2, including 40 CFR Part 75, EPA's acid rain control program, implemented under Title IV of the Clean Air Act, as amended by the Clean Air Act Amendments of 1990 (the Act, 42 U.S.C. 7651). Part 75 requires affected electric

utility units to install and operate continuous emission monitoring systems that provide EPA with continuous hourly measurements of sulfur dioxide, nitrogen oxides, carbon dioxide, and volumetric flow rate. Volumetric flow rate and sulfur dioxide concentration are used to calculate sulfur dioxide mass emissions at each affected source. At the end of each year, these emissions are compared to the unit's sulfur dioxide allowance to determine compliance. Accuracy of compliance determinations is improved by periodic performance testing of volumetric flow rate monitors by comparison with EPA's Method 2.

In the first three years of the Acid Rain Program, the electric utility industry raised concerns that under some flow conditions EPA's approved test method for volumetric flow rate (Method 2) was less than optimal for measuring sulfur dioxide emissions and calculating heat input. To address these concerns, EPA conducted an interlaboratory field study to evaluate new test methods. The data and findings of this study formed the technical basis for the three new test methods.

Method 2 does not include procedures for measuring either yaw or pitch angles or wall effects in calculating volumetric flow rate. In the Acid Rain Program and in other programs requiring reporting of mass emission rates, e.g., lbs SO₂/hour, a capability to measure these parameters in the calculation of volumetric flow rate could improve the reporting of pollutant emissions in some situations. The new test methods offer new options to account for yaw and pitch components of flow and wall effects in stacks and ducts. The new test methods are also expected to help reduce the disparity that has sometimes been reported between stack-measured power plant heat rate and combustion-calculated heat rate. Heat rate is important to power plants because it affects electric rates, and limitations on plant operations in State permits.

MAIN FEATURES OF THE NEW METHODS

Method 2F

Method 2F - "Determination of Stack Gas Velocity and Volumetric Flow Rate With Three-Dimensional Probes," is a method for measuring both the yaw and pitch angle-adjusted (or axial) velocity with 3-dimensional probes like the prism-shaped, five-hole probe and the five-hole spherical probe.

Method 2G

Method 2G - "Determination of Stack Gas Velocity and Volumetric Flow Rate With Two-Dimensional Probes," is a variant of existing Method 2 that describes the use of yaw angle determination procedures with Type S or three-dimensional probes to determine the yaw angle-adjusted flue gas velocity in a stack or duct. Method 2G does not, however, account for the pitch angle of flow.

Method 2H

In any stack or duct with flowing gas, the gas velocity will approach zero near the stack or duct wall. Method 2H - "Determination of Stack Gas Velocity Taking into Account Velocity Decay Near the Stack Wall," can be used in conjunction with existing Method 2 or new Methods 2F or 2G to account for the velocity drop-off near stack or duct walls when determining volumetric flow rate.

FOR FURTHER INFORMATION

If you have any questions or require further information regarding the application of these new methods to 40 CFR Part 60, 61, or 63, please contact Bill Grimley at (919) 541-1065 or Tom Logan at (919) 541-2580. If you have any questions or require further information regarding the application of these new methods to the Acid Rain Program, please contact John Schakenbach at (202) 564-9158 or Elliot Lieberman at (202) 564-9136.

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